In the Claims:

Claims 1 - 21 (canceled).

Claim 22. (Previously presented) A system for verifying the authenticity of an object comprising:

an optical signal source;

a first beam expander for expanding a first signal received from the optical signal source;

a first collimating lens for collimating the first signal;

a primary image disposed within the path of the first signal;

a first transforming lens disposed within the path of the first signal;

a filter matched to a random code is disposed within the path of the first signal;

an imaging arrangement for imaging a first image comprising a convolution of the primary image and the random code;

a second beam expander for expanding a second signal received from the optical signal source;

a second collimating lens for collimating the second signal;

a beam splitter for receiving the collimated second signal and a reference signal from a reference image to provide a second image;

a second transforming lens disposed within the path of the second image;

a beam combiner for combining the first and second images;

a detector for recording the combined first and second images generating thereby a joint power spectrum; and

a correlator in communication with the detector for generating a correlation signal from the joint power spectrum, the correlation being indicative of a correlation of the primary image and the reference image.

Claims 23 - 26 (canceled).

Claim 27. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 22 wherein the optical source is a source of coherent light.

Claim 28. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 27 wherein the source of coherent light comprises a laser operative to provide a laser beam to form the first and second signals.

Claims 29 - 31 (canceled).

Claim 32. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 22 wherein the detector comprises a charge coupled device.

Claim 33. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 22 wherein the correlator comprises:

a nonlinear transfer function generator for applying a *k-th* power law nonlinear transformation to the joint power spectrum; and

a transforming system in signal communication with the nonlinear transfer function generator for performing the correlation of the joint power spectrum that has been nonlinearly transformed; and

a system for analyzing the peaks of the correlation of the joint power spectrum that has been nonlinearly transformed.

Claim 34. (Withdrawn) A method of verifying the authenticity of an object, the method comprising:

encoding a primary image;

convolving the encoded primary image with a random code, generating thereby a first reference image;

transforming the first reference image; and

correlating the first reference image with a second reference image.

Claim 35. (Withdrawn) The method as set forth in Claim 34 wherein encoding the primary image comprises phase encoding the primary image.

Claim 36. (Withdrawn) The method as set forth in Claim 35 wherein phase encoding the primary image comprises phase encoding the primary image according to the equation

$$g(x,y) = exp\{i\pi f(x,y)/Max[f(x,y)]\},$$

where $f(x,y)$ is the primary image, $Max[f(x,y)]$ is the maximum value of $f(x,y)$ and $g(x,y)$ is the phase encoded primary image.

Claim 37. (Withdrawn) The method as set forth in Claim 34 wherein convolving the encoded primary image with a random code comprises convolving the encoded primary image with a random code that is the Fourier transform of a phase-only uniform random distribution.

Claim 38. (Withdrawn) The method as set forth in Claim 34 wherein convolving the encoded primary image with a random code comprises convolving the encoded primary image $\bar{r}(x,y)=\frac{r(x,y)}{|r(x,y)|}$ with a filter that is matched to the random code.

Claim 39. (Withdrawn) The method as set forth in Claim 34 wherein transforming the first reference image comprises Fourier transforming the first reference image.

Claim 40. (Withdrawn) The method as set forth in Claim 34 wherein correlating the transformed first reference image with a second reference image comprises generating a phase-only first reference image according to the equation,

wherein $r(x,y)$ is the first reference image, $|r(x,y)|$ is the modulus of the first reference image and

$$\bar{r}(x,y)$$

is the phase-only first reference image.

Claim 41. (Withdrawn) The method as set forth in Claim 34 wherein correlating the first transformed reference image with a second reference image comprises transforming the second reference image.

Claim 42. (Withdrawn) The method as set forth in Claim 41 wherein correlating the first transformed reference image with a second reference image comprises generating a joint power spectrum of the first transformed reference image and the second transformed reference image.

Claim 43. (Withdrawn) The method as set forth in Claim 42 further comprising: applying a threshold function equal to the sum of the self product terms of the joint power spectrum to joint power spectrum, generating thereby a modified joint power spectrum;applying a *k-th* power law nonlinear transformation to the modified joint power spectrum; and

analyzing the peaks of the correlation of the modified joint power spectrum of the first reference image and the second reference image;

wherein the presence of a single peak indicates the authenticity of the object and the presence of no peaks indicates the lack of authenticity of the object.

Claim 44. (Withdrawn) The method as set forth in Claim 43 wherein performing the correlation of the modified joint power spectrum comprises:

inverse Fourier transforming the modified joint power spectrum; and

squaring the modulus of the inverse Fourier transform of the modified joint power spectrum.

Claim 45. (Withdrawn) The method as set forth in Claim 43 wherein k lies within the interval between zero and one inclusive.

Claim 46. (Withdrawn) The method as set forth in Claim 40 wherein generating a phase-only reference image includes binarizing the phase-only reference image according to the equation

$$\overline{r_B}(x,y)=\frac{r(x,y)}{|r(x,y)|}$$

where

$$\overline{r_B}(x,y)=\begin{cases} -1 \text{ if } Re[r(x,y)]<0, \\ 1 \text{ if } Re[r(x,y)]\geq 0 \end{cases}$$

wherein $\overline{r}_B(x,y)$ is the binarized phase-only reference image and wherein $Re[r(x,y)]$ denotes the real part of $r(x,y)$.

Claim 47. (Withdrawn) The method as set forth in Claim 34 further comprising affixing the second reference image to an object, the authenticity of which is to be verified.

Claim 48. (Withdrawn) A method of generating a reference image for verifying the authenticity of an image, the method comprising encoding a primary image;

convolving the encoded primary image with a random code, generating thereby a reference image;

transforming the reference image.

Claim 49. (Withdrawn) The method as set forth in Claim 48 wherein encoding the primary image comprises phase encoding the primary image.

Claim 50. (Withdrawn) The method as set forth in Claim 49 wherein phase encoding the primary image comprises phase encoding the primary image according to the equation

$$g(x,y) = exp\{i\pi f(x,y)/Max[f(x,y)]\},$$

where $f(x,y)$ is the primary image, $Max[f(x,y)]$ is the maximum value of $f(x,y)$ and $g(x,y)$ is the phase encoded primary image.

Claim 51. (Withdrawn) The method as set forth in Claim 48 wherein convolving the encoded primary image with a random code comprises convolving the encoded primary image with a random code that is the Fourier transform of a phase-only uniform random distribution.

Claim 52. (Withdrawn) The method as set forth in Claim 51 wherein convolving the encoded primary image with a random code comprises convolving the encoded primary image with a filter that is matched to the random code.

Claim 53. (Withdrawn) The method as set forth in Claim 48 wherein transforming the reference image comprises Fourier transforming the reference image.

Claim 54. (Withdrawn) A method of encrypting a set of data, the method comprising:

encoding the set of data with a first encryption key;

transforming the set of data encoded with the first encryption key;

with a second encryption key, encoding the transformation of the set of data encoded with the first encryption key; and

transforming the encoded transformation of the set of data encoded with the first encryption key generating thereby an encrypted set of data.

Claim 55. (Withdrawn) The method as set forth in Claim 54 wherein the set of data includes an optical image, a transparency, a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, and electrical signal or an optical signal.

Claim 56. (Withdrawn) The method as set forth in Claim 54 further comprising acquiring the set of encrypted data in a medium responsive to an optical signal, a transparency, a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data an electrical signal or an optical signal.

Claim 57. (Withdrawn) The method as set forth in Claim 56 wherein acquiring the set of encrypted data comprises combining the set of encrypted data with a reference set of data.

Claim 58. (Withdrawn) The method as set forth in Claim 57 wherein combining the set of encrypted data with a reference set of data includes holographically combining the set of encrypted data with a reference set of data.

Claim 59. (Withdrawn) The method as set forth in Claim 58 wherein the reference set of data comprises a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data an electrical signal or an optical signal.

Claim 60. (Withdrawn) A method of encrypting and decrypting a set of data, the method comprising:

encoding the set of data with a first encryption key;

transforming the set of data encoded with the first encryption key;

with a second encryption key, encoding the transformation of the set of data encoded with the first encryption key;

transforming the encoded transformation of the set of data encoded with the first encryption key generating thereby an encrypted set of data; and

decrypting the encrypted set of data.

Claim 61. (Withdrawn) The method as set forth in Claim 60 wherein the set of data includes an optical image, a transparency, a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data, and electrical signal or an optical signal.

Claim 62. (Withdrawn) The method as set forth in Claim 40 further comprising acquiring the set of encrypted data in a medium responsive to an optical signal, a transparency, a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data an electrical signal or an optical signal.

Claim 63. (Withdrawn) The method as set forth in Claim 62 wherein acquiring the set of encrypted data comprises combining the set of encrypted data with a reference set of data.

Claim 64. (Withdrawn) The method as set forth in Claim 63 wherein combining the set of encrypted data with a reference set of data includes holographically combining the set of encrypted data with a reference set of data.

Claim 65. (Withdrawn) The method as set forth in Claim 64 wherein the reference set of data comprises a binarized image, a one dimensional set of data, a two dimensional set of data, a multi-dimensional set of data an electrical signal or an optical signal.

Claim 66. (Withdrawn) The method as set forth in Claim 60 wherein decrypting the set of encrypted data comprises:

acquiring the second encryption key as a hologram;

combining the encrypted set of data and the second encryption key; and

transforming the combination of the encrypted set of data and the second encrypted key.

Claim 67. (Withdrawn) The method as set forth in Claim 66 wherein transforming the combination of the set of encrypted data and the reference set of data includes Fourier

transforming the combination of the set of encrypted data and the reference set of data.

Claim 68. (Withdrawn) The method as set forth in Claim 54 wherein encoding the set of data with a first encryption key includes multiplying the set of data by the first encryption key.

Claim 69. (Withdrawn) The method as set forth in Claim 54 wherein transforming the set of data encoded with the first encryption key includes Fourier transforming the set of data encoded with the first encryption key.

Claim 70. (Withdrawn) The method as set forth in Claim 54 wherein with a second encryption key, encoding the transformation of the set of data encoded with the first encryption key includes multiplying the second encryption key by the transformation of the set of data encoded with the first encryption key.

Claim 71. (Withdrawn) The method as set forth in Claim 54 wherein transforming the encoded transformation of the set of data encoded with the first encryption key includes Fourier transforming the encoded transformation of the set of data encoded with the first encryption key.

Claim 72. (Withdrawn) A system for encrypting a set of data, the system comprising:

a signal source;

a first subsystem receiving a first signal from the signal source and providing as out therefrom a first output signal;

a second subsystem receiving a second signal from the signal source and providing as output therefrom a second output signal;

a third subsystem for combining the first and second signal output.

a fourth subsystem for acquiring the set of encrypted data.

Claim 73. (Withdrawn) The system as set forth in Claim 72 wherein the signal source is comprises an optical source.

Claim 74. (Withdrawn) The system as set forth in Claim 73 wherein the optical source comprises a coherent source.

Claim 75. (Withdrawn) The system as set forth in Claim 74 wherein the first subsystem comprises:

a spatial filter disposed within the path of the coherent source;

a collimating lens disposed within the path of the coherent source; and

a beam splitter disposed within the path of the coherent source for dividing the coherent source into a first signal and a second signal.

Claim 76. (Withdrawn) The system as set forth in Claim 74 wherein the second subsystem comprises:

a first transforming lens disposed within the first signal path;

a second transforming lens disposed within the first signal path; and

a beam redirection apparatus for redirecting the first signal path.

Claim 77. (Withdrawn) The system as set forth in Claim 74 wherein the third subsystem comprises:

a beam redirection apparatus for redirecting the second signal path;

a phase mask disposed within the second signal path;

a third transforming lens disposed within the second signal path;

a fourth transforming lens disposed within the second signal path; and

a fifth transforming lens disposed within the second signal path.

Claim 78. (Withdrawn) The system as set forth in Claim 74 wherein the fourth subsystem comprises:

a beam combiner for combining the first and second signals; and

a recording apparatus for recording the combination of the first and second signals.

Claim 79. (Withdrawn) The system as set forth in Claim 29 wherein the filter comprises a spatial filter matched to the random code.

Claim 80. (Withdrawn) The system as set forth in Claim 29 wherein the primary image and the random code are disposed at a first focal plane of the first transforming lens.

Claim 81. (Withdrawn) The system as set forth in Claim 29 wherein the filter is disposed at a second focal plane of the first transforming lens.

Claim 82. (Withdrawn) The system as set forth in Claim 30 wherein the reference image is affixed to the object, the authenticity of which is to be verified.

Claim 83. (Withdrawn) The method as set forth in Claim 66 wherein combining the encrypted set of data and the second encryption key includes multiplying the encrypted set of data and the second encryption key.

Claim 84. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 22 wherein the imaging arrangement comprises imaging lenses.

Claim 85. (Previously presented) The system for verifying the authenticity of an object as set forth in Claim 22 wherein the filter comprises a spatial filter.

It is believed that this Response is fully responsive to this Notice and that the Amendment should now be in compliance, whereby consideration and entry thereof is respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorney.

Respectfully submitted,

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